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ABSTRACT

A microcomputer spreadsheet software package can be used for a variety of tasks to manage a program or research project and to cut costs in evaluation. LOTUS 1 2 3 is a versatile, commonly available, and well-known electronic spreadsheet package. Spreadsheets were originally designed to emulate financial ledgers and balance sheets. They are useful for estimating projected costs and for simplified budgets. Subtotals and totals for a number of categories are automatically updated when an amount is changed. Similar techniques may be used to collect, code, sort, and analyze research data--a particularly useful technique for tabulating questionnaire responses. It is also possible to enter questionnaire responses into the spreadsheet while conducting a telephone interview. Several commands may be chained together into a macro, in order to simplify data entry at the terminal. LOTUS can be programmed to perform statistical procedures, and can sort and graph data. Data are stored on a floppy diskette and may be transferred to a mainframe computer, word processor, or software package. The amount of data which can fit into a spreadsheet is limited by the amount of memory capacity of the hardware system and the ease of moving around many screens of data. (GDC)

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USING AN ELECTRONIC SPREADSHEET TO CUT COSTS IN EVALUATION

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Introduction

Today many agencies and organizations face budget cuts and the demand to account for the effective use of resources that are allocated. These demands have led to increased interest in quantitative research and evaluation. Also in recent years, advancements have made microcomputer technology accessable to most any organization/agency. In addition sophisticated software packages which address a variety of consumer needs are becoming increasingly available. One type of packaged program is the **Electronic Spreadsheet**. It is the electronic spreadsheet which we in the IVE Project have found very helpful as a tool to accomplish a variety of tasks, and to cut costs in evaluation.

Like any aspect of the Computer Age, there is a proliferation of electronic spreadsheets on the market. This paper will discuss **Lotus 1-2-3**, one of many available spreadsheet packages. It is extremely versatile and is currently the best-known, best-selling electronic spreadsheet on the market. It is available for use on most major brands of microcomputers, and costs roughly $500. Although **Lotus 1-2-3** is the focus of this paper, in no way are the authors trying to portray it as the only or best package on the market.

The discussion is directed to persons with a basic understanding of microcomputers and software packages. It is assumed that the reader is acquainted with spreadsheets; has a general idea of how they work.

This paper is organized around three major questions:

1. How can a spreadsheet help one manage a program or research project?
2. How can a spreadsheet help one effectively collect, code, and analyze research data?
3. What are some of the pros and cons of using electronic sheets?

The Spreadsheet as a Management Tool

The electronic spreadsheet was initially developed for business

applications. Programmers wished to emulate financial ledgers and balance sheets which performed calculations automatically, and posted entries more accurately than human hands with paper, pencil, and calculator. Therefore these types of tasks are a natural for any spreadsheet. In addition to the usual mathematical calculations associated with accounting, LOTUS has limited data-base-management and graphing capabilities.

A new generation of spreadsheets arriving on the market only this summer include word processing, telecommunications, and more. Given these capabilities, the electronc spreadsheet can provide considerable advantages for those who find themselves pressed into collecting and maintaining quantitative data on their agency/organization.

A word of caution: the capabilities and effectiveness of spreadsheets are limited by the amount of memory (RAM) available in the microcomputer.

Projecting Costs

LOTUS' menu options allow one to quickly build a table of estimates. Using such a table, one can vary (for example) monthly personnel expenses, to see the net effect on a two year budget.

Simplified Budget Systems

Budget sheets and ledgers can be created which have subtotals and totals which automatically are updated when information is added or subtracted from journal entries or T-accounts. On a single spreadsheet you may have several small accoounts for individual budget categories. Each of these accounts can be prepared beforehand so that entries in a given account will automatically update the account total.

Each of the accounts can then be linked to an "overall budget sheet" which lists (a) amounts allocated to the several budget categories, (b) expenditures to date, and (c) balances. After the balance sheet is set up with formulas, no data need be typed in. Essentially, you can program it to automatically reflect any updating that occurs in the accounts.

Aiding in the projection of costs and the development and maintenance of budgets are two ways in which an electronic spreadsheet can provide considerable help in project/program management. The discussion will now focus on the use of spreadsheets for collecting, coding, sorting, and analyzing research data.

Using an Electronic Spreadsheet to Manage Research/Evaluation Data

Management of Questionnaire Returns

Some studies require careful follow-up procedures of mailed questionnaires.

Recently we monitored the return of over 1500 questionnaires using a spreadsheet. Doing so not only allowed us to have an accurate accounting of the information being returned, we used it to print out lists of those who had not yet responded.

Computer-Assisted Telephone Interviewing

This application requires some added expendures for the purchase of a headset for the computer operator. However, headphones and mike can be inexpensively purchased at some computer stores.

The interviewer can use an interview schedule (on paper) while typing in responses long, or short-answer items. Using the keyboard, an interviewer can usually capture information more quickly than with paper and pencil. Also the spreadsheet can be formatted in such a way that responses are input in the form that will be required for later analysis.

A more elaborate system may involve putting the inverview schedule onto the the computer. This requires some knowledge of programming; certainly not a high level of expertise, but at least a good knowledge of the ins-and-outs of microcomputer programmming. Once in the computer, the interviewer, wearing the headphone set, places the call and simply types into the computer the respondents' answers.

Coding and Sorting of "Content" Responses

From survey instruments, or even taped interviews, content information can be typed into a series of rows (one respondents' answers per row). In columns adjacent to those which contain the content information, code numbers can be entered to identify the type of content contained in each row. The rows can then be sorted; items of similar content being grouped together.

Data Entry Simplified With Macros

Throughout this paper, the authors have tried to stay clear of as much "computerese" as possible. However, this is a case in which the word is defined by its association with computer terminology. Macros are simply the chaining together of several keyboard commands. This is done so that the operator does not have to go through a highly repetative series of key strokes to undertake a given operation. Instead, once a macro is set up, one must simply strike two keys to invoke an entire sequence where before, many keys would have had to be struck to accomplish the same thing. Thus a macro can save an operator a lot of time if s/he is working on a repetitive task such as data entry.

Macros can be used to program the computer so that that it responds like a data-entry terminal. Advanced macros may be used to "verify" the accuracy of data which has been entered.

Friends With Mainframes

When LOTUS spreadsheets are saved in a particular way, they are saved as "flat" ASCII files which can then be transferred into software packages on compatible microcomputers. For example tables may be developed on LOTUS, then imported into a word processing document. Such files can also be telecommummicated for use on minicomputers or mainframes. An evaluator who uses batch processing of statistical programs (such as SPSS) may find it useful to create one or a series of program files on his/her microcomputer, then telecommunicate them for mainframe use. There are a number of reasons why this method may be helpful:

Terminals which access your particular mainframe(s)

1. may be outdated or difficult to use
2. may be reserved for other users
3. may be expensive
4. may have restricted access; hours that don't fit your schedule

Floppy diskette storage of mainframe data files may be an alternative you have not considered. It is inexpensive and convenient. A "flat" file of fairly large size (as large as the capacity of your diskettes) can be stored on a 5 1/4" floppy disk. Converting a data file to a LOTUS file can be done simply as long as general formatting requirements are observed. Beware however, because a LOTUS file requires more disk space than a "flat" file containing the same data.

Data Analysis

An evaluator can interactively work with a data set on Lotus to create frequency distributions, and to do simple statistical procedures, such as calculating means, standard deviations and square roots. Someone with experience could program LOTUS to perform more sophisticated statistical functions (for example we have used it to calculate correlation coefficients). But if one has access to larger computers (with sophisticated statistical software packages) the latter may be a more practical alternative.

How Much Data Will Fit Into a Spreadsheet

Theoretically LOTUS has hundreds of columns, and over a thousand rows of space in an active worksheet. Actually, you are limited by the active memory capacity of your hardware system. Assuming your microcomputer has 512K of memory, you could easily perform analyses on a data set as large as 80 cells wide (a cell can hold several characters of information), and 200 rows deep. The larger the data set, the more difficult it becomes to move around the sheet, so despite the feasibility of working with this much data, you may find yourself cramped.

Sorting Data

Assume that you have a small data set, which you have typed onto a LOTUS spreadsheet. It consists of three adjacent columns, twenty numbers in each. Using the data base management functions you can sort this table by any of the three columns. That is, you can array it in numerical order with the lowest or highest number on top. You can sort a column by itself, or link it with the adjacent columns so that rows remain intact. Sorting simplifies other procedures such as grouping scores by their values, or calculating percentiles.

Graphing

Raw data, sorted data, or the results of a frequency distribution can be visualized in graph form in just a few keystrokes. The graphing menu has options which allow you to choose one of 5 types of graphs available. These include pie charts, line graphs, and two types of bar graphs. The "XY" graph can be used to produce scattergrams.

Menu options also allow the user to increment or label the x or y axis, and to otherwise document the graphed information. Once all the key elements of a graph have been entered, the user can flip from one graph-type to another to decide which best depicts the information contained. Graphs can be saved and printed later or recalled and updated.

Pros and Cons of Using Electronic Spreadsheets

Drawbacks to Consider:

- A fairly substantial investment is necessary, especially if the computer has to be purchased.
- Considerable training is necessary to use the spreadsheet to its full potential.
- Electronic spreadsheet applications may not be frequently used. Use depends upon the necessity to provide data and the availability of both computer and software.
- Spreadsheets do not allow for sophisticated statistical analyses.
- Graphic quality is currently not very good in most spreadsheets.
- The need for expanded memory capacity of the microcomputer may be a hidden expense.
- As one becomes more familiar with the capabilities of spreadsheets, more and more time may be taken up experimenting.

Positive Aspects of Electronic Spreadsheet Use on Microcomputers:

- Savings in time and money.
- Improved accuracy in working with numbers.
- Microcomputers and software may be more readily available to agencies/organizations with limited resources.
- Electronic spreadsheets open the door to more sophisticated research/evaluation methodologies.
- Microcomputers and spreadsheets can be used to communicate with mainframes which greatly expands research/evaluation capabilities.

Considering both the positive and negative aspects of the software, we feel that particularly if you already have a microcomputer, a spreadsheet has considerable potential for you if you plan to use the spreadsheet for a variety of applications. If it is used only for one or two purposes, it may not be worth the investment.

The reader should also be aware that educational discounts on the different brands of spreadsheet software range from 10-90%. If you plan to use it for educational purposes, it is possible that the cost may be drastically lower than listed retail.

Finally we would like to say that we have not reported all the options that we have explored in using this single type of software, but have reported those which would be of general interest. There are yet others which we have not have had time to investigate, and perhaps many more still to uncover. We certainly feel that the investment has brought a good return, and recommend to those actively engaged in evaluation or research to investigate it.